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on the sins of terminology? Is it not possible by discussion to discover or develop principles of scientific nomenclature the establishment of which may make the canons of good taste general instead of personal? I have a suspicion that there are heavy battalions of argument back of Dr. Eastman's skirmish line of assertion; and so venture a few suggestions in the hope of drawing them to the front.

One suggestion is that utility may have an important bearing on our sense of fitness, or even elegance; that there may be a deep philosophic basis for the maxim 'handsome is that handsome does.' Is there not a tendency gradually to adjust esthetic judgments into conformity with rational judgments? Is not expressiveness, after all, the most admirable and the most admired quality of literary composition? And will not the system of technical nomenclature best adapted to practical needs become in the end most grateful to the esthetic sense?

In deprecating the belief of physiographers 'in the penury of the English language, and unsuitability of Saxon epithets,' and in stigmatizing the introduction of 'alien' words, Dr. Eastman seems to oppose the introduction of foreign words for the purposes of scientific terminology. As a large majority of new terms in science are either direct importations or else rearrangements of foreign material, and as the somatic growth of all languages is largely from alien sources, this view is, to say the least, radical, and should not be accepted without good reason. Have I possibly misunderstood him? Or is there a substantial basis for such an opinion?

He objects vigorously to the use of the humanistic analogy, and here I follow him so far as to admit that it has sometimes been carried too far. That is a danger to which all figurative language is exposed, but it is the ordinary danger from excess, and I would not therefore condemn the use of figures. Purely as a matter of literary taste I like the humanistic analogy in Eastman's 'rabble of words recruited from the uttermost parts'; and from the same point of view I like also Davis's characterization of the stages of the topographic

cycle in terms of the cycle of human life. Eastman says the physiographic figure is founded on a 'false analogy,' but this I do not admit. The rhetorical quality of good analogy is close resemblance in some striking particular, coupled with difference in other respects; and that is precisely the relation between the topographic and human cycles. The stream valley resembles the human being in that from an early stage it evolves normally through a definite sequence of stages; and in most other respects the two differ.

But the characterization of topographic stages as 'youthful,' 'mature' and 'senile' is not a mere literary flower, the transitory decoration of a sentence; it is a part of technical terminology in continuous employment; and in that capacity its utility is of primary importance. In my judgment there are few groups of terms which serve better than does this group the purpose of concisely expressing an idea. Its strength inheres, first, in the aptness and completeness of the analogy, and, second, in the perfect familiarity of the group of facts to which the unfamiliar facts are likened. The physiographic stages have no precise limits, but grade one into another as parts of a continuous development; each one is so complex in its phenomena and so variable from individual to individual that sharp-cut definition is impossible; and in these respects they are strictly paralleled by the life stages. The aptness and the familiarity make the terms permanently mnemonic, so that the use of any one of them brings to mind not only the sequence, but relative position within the sequence. Davis's generalization had such merit that it would probably have found eventual appreciation, whatever its mode of expression, but I think that the promptness and universality of its acceptance and assimilation were in large measure due to the felicity of the associated terminology.

G. K. GILBERT.

WASHINGTON, D. C.

L'ANNÉE BIOLOGIQUE.

TO THE EDITOR OF SCIENCE: We learn that the annual *L'Année biologique* is in danger of being discontinued unless it receives addi-

tional support. One hundred more subscribers in this country would probably encourage the editors to go on with it. These ought not to be difficult to get. To those who are unacquainted with it we may say that it is quite unique and occupies a different and higher plane than most bibliographic works. There is not merely a more or less roughly classified list of titles and brief abstracts of contents, but a series of logically arranged *critical* reviews pointing out the bearing of the paper, reviewed on the state of knowledge of the subject. The systems of cross referencing and indexing are wonderfully complete. The reviews are arranged primarily into twenty chapters, as follows: Cell, sex products and fertilization, parthenogenesis, asexual reproduction, ontogenesis, teratogenesis, regeneration, grafting, sex and pleomorphism, alternation of generations, latent characters, correlation, death, general morphology and physiology, heredity, variation, origin of species and specific characters, geographic distribution, nervous system and functions, general theories. Most of these chapters are elaborately subdivided. A feature has been comprehensive reports on the state of our knowledge of special topics. No one who is interested in the development of the topics named above can view with equanimity the prospect of the loss of this review. It is to be hoped that every biological laboratory and every library that has a scientific department and which lacks *L'Année biologique* will at once send a subscription to Schleicher frères, Paris, the publishers, or to Professor Y. Delage, Sorbonne, Paris, the chief editor.

CHAS. B. DAVENPORT,
JACQUES LOEB.

THE EPIDIASCOPE.

TO THE EDITOR OF SCIENCE: Who saw the epidiascope at the St. Louis Exposition? It appears in the catalogue of German scientific instruments at page 211, and is a most interesting type of projection apparatus, of especial utility to all schools. The possibility of speedy and facile transition from reflected to transmitted light, if worked out to the last optical and mechanical detail, would render

it worthy of wide adoption. The diffusion of knowledge of all the arts and sciences ought to be very materially enhanced by this perfected apparatus. The projection of printed pages, photographs, charts and works of art, all without the necessity of photography, is most important. The name of the inventor is not given: presumably Carl Zeiss, of Jena.

DAVID P. TODD.

AMHERST COLLEGE OBSERVATORY.

SPECIAL ARTICLES.

THE INFLUENCE OF CAVERNS ON TOPOGRAPHY.

It is well known that caverns, particularly those in regions underlain by limestone, are frequently associated with depressions in the surface above them, such as sink-holes, or swallow-holes, as they are commonly termed. It is also a familiar fact that the falling of portions of the roofs of caverns sometimes gives origin to ravines, canyons, etc., which are occasionally spanned by remnants of the roofs which remain in place, as in the case of the natural bridge of Virginia, and in other similar ways influence surface relief. A characteristic feature of this class of topographic changes is that depressions in the surface of the land are produced. The class of land forms to which attention is here invited, however, are exceptional, and, as it seems, have not been recognized as having a direct association with caverns, for the reason that they stand in relief and in some instances are conspicuous and picturesque on account of their height and boldness.

The topography of most regions the world over owes its leading characteristics, aside from elevation above the sea, to erosion. The chief exceptions are elevations produced by volcanic and glacial deposition. Erosion, particularly by streams, leads to the production of two classes of earth features, one class being due to the removal of material, as in the excavation of valleys, while the other class includes the remnants of uplands left when erosion to a plane surface is incomplete. In the production of such topographic changes, weak rocks, as a rule, are removed most readily and are replaced by depressions; while resistant rocks persist longer and are left in relief.